Annals of Clinical and Analytical Medicine
Original Research

The effects of minimally invasive surgery in liver hydatid cysts

Enes Şahin[1], Mehmet Eşref Ulutaş[2]
[1] Department of General Surgery, Faculty Of Medicine, Kocaeli University, Kocaeli
[2] Department of General Surgery, University of Health Sciences, Gaziantep City Hospital, Gaziantep, Turkey

Abstract
Aim: This study aims to compare laparoscopic and open surgical techniques in hepatic hydatid cysts.
Materials and Methods: This retrospective study was conducted at the Department of General Surgery, Faculty of Medicine, Kocaeli University. Patients who underwent surgery for hydatid liver cysts between January 1, 2020, and January 1, 2025, were included in the study. Cases were divided into two groups: the laparoscopic and open groups. The demographic and clinical characteristics of the patients were obtained through a review of their medical records.
Results: A total of 39 patients, 20 male and 19 female, were included in the study. The mean age of the patients was 43.3 (± 17.2). Laparoscopic surgery was performed on 8 patients and open surgery on 31 patients. Although the length of hospital stay was longer in the open group, no significant difference was found. (p=0.08) The most common type of cyst in all groups was a single cyst. The largest cyst diameters were 8.2 cm in the laparoscopic group and 9.1 cm in the open group. (p=0.58) Although bile duct-related cysts were more common in the open group, no significant difference was detected. (p=0.82) According to the Gharby classification, types 1, 2, and 3 cysts were more common in the laparoscopic group, while types 4 and 5 cysts were more common in the open group. (p<0.001) The most commonly performed procedure was cystotomy and external drainage.
Discussion: In the treatment of hydatid cysts, laparoscopic treatment is as effective as open surgery, with shorter hospital stays and similar recurrence rates.

Keywords
Hydatid Cyst, Laparoscopic, Liver, Open Surgery

DOI: 10.4328/ACAM.22789 Received: 2025-06-29 Accepted: 2025-07-29 Published Online: 2025-07-31 Printed: 2025-08-01 Ann Clin Anal Med 2025;16(8):603-607
Corresponding Author: Mehmet Eşref Ulutaş, Department of General Surgery, University of Health Sciences, Gaziantep City Hospital, Gaziantep, Turkey.
E-mail: esref_ulutas@hotmail.com P: +90 332 221 00 00
Corresponding Author ORCID ID: https://orcid.org/0000-0002-9206-4348
Other Authors ORCID ID: Enes Şahin, https://orcid.org/0000-0003-3777-8468
This study was approved by the Ethics Committee of Kocaeli University, Faculty of Medicine (Date: 2025-04-24, No: KÜ GOKAEK-2025/09/12)

Introduction

Liver hydatid cyst, also known as echinococcosis, is a disease caused by the Echinococcus granulosus tapeworm. It is more common in rural areas where animal husbandry is widespread than in urban centers. It is more prevalent in certain countries in Asia, such as the Middle East, Africa, South America, India, Pakistan, and China [1].

The main approaches to treating hydatid cysts are surgical or percutaneous drainage treatments. In addition, antiparasitic treatments are also used. Percutaneous treatment (PAIR) can only be used on certain selected patients. These are generally type 2-3 hydatid cysts. Surgical treatments must be used on patients who cannot undergo PAIR treatment [2,3].

Surgical treatment is commonly performed as an open procedure. Although open surgery appears to be more effective in controlling cysts, it has disadvantages such as a large incision, more postoperative pain, and slower recovery. For this reason, minimally invasive treatment methods have also come to the fore in the treatment of these cysts. These methods are known to have advantages such as smaller incisions, less postoperative pain, and faster recovery and return to work [4].

This study aims to compare laparoscopic and open surgical techniques used in the treatment of hydatid cysts.

Materials and Methods

Trial Design

This retrospective study was conducted in the Department of General Surgery at Kocaeli University Faculty of Medicine. Written informed consent was obtained from all individual participants included in the study. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Participants and Eligibility Criteria

Adult patients who underwent surgery for suspected hydatid liver cysts between January 1, 2020, and January 1, 2025, were included in the study.

Inclusion criteria were as follows: patients over the age of 18 and patients who underwent surgery due to hepatic hydatid cyst.

Exclusion criteria were as follows: patients under the age of 18, patients who underwent other treatment methods (PAIR) due to hepatic hydatid cyst.

Outcomes

The medical records of the included patients were reviewed to collect clinical data such as demographic characteristics (age, gender), presenting complaints, medical history, previous treatments, preoperative imaging methods and laboratory results, characteristics of the cysts, and surgical procedures performed. Patients were divided into two groups based on the surgical procedures performed: laparoscopic and open groups, and demographic and clinical data were compared between these groups.

The primary outcome was the recurrence rate, while the secondary outcomes included the surgical procedures performed and other clinical data.

Statistical Analysis

Normality was assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests. If normality was violated in any group, non-parametric tests were applied. The Mann-Whitney U test compared continuous variables, while chi-square and Fisher's exact tests analyzed categorical variables. Data were presented as means and medians (min–max) for quantitative variables and percentages for qualitative variables. Statistical analysis was performed with SPSS version 22.0, and $p < 0.05$ was considered significant.

Ethical Approval

This study was approved by the Ethics Committee of Kocaeli University, Faculty of Medicine (Date: 2025-04-24, No: KÜ GOKAEK-2025/09/12).

Results

A total of 39 patients were included in the study. Eight of these patients underwent laparoscopic surgery, while 31 underwent open surgery. The average age of the patients was 43.3 (± 17.2). The average age in the laparoscopic group was 35.6 (±13.2), while in the open group it was 45.3 (± 17.7). (p=0.16) Twenty patients were male and 19 were female. No difference was found between the groups in terms of gender (p=0.38) (Table 1).

When the patients' presenting complaints were examined, the most common complaint in both groups was abdominal pain. Additionally, the proportion of patients without active complaints was also high. No significant difference was found between the groups in terms of presenting complaints (p=0.84) (Table 1).

When the patients' medical histories and family histories were examined, only one patient had a family history (2.6%), and PAIR or surgical treatment had been administered to five patients previously (12.8%). Although no statistical difference was found in terms of hospital stay duration, the hospital stay duration of patients in the open group was longer (11.1–6.4) (p=0.08). Recurrence rates were lower in the laparoscopic group compared to the open group, but this difference was not statistically significant. (12.5-12.9%) (p=0.97) The need for postoperative ERCP occurred in a total of 8 patients, all of

Table 1. Comparison of clinical characteristics of patients

	Total (n=39)	Laparoscopic (n=8)	Open (n=31)	P
Age (year)	43.3 ± 17.2	35.6 ± 13.2	45.3 ± 17.7	0.16
Gender (Male/Female)	20 / 19	3.5	17 / 14	0.38
Presenting Complaints				
Abdominal pain	27 (% 69.2)	6 (% 75)	21 (% 67.7)	0.84
Weakness	1 (% 2.6)	0	1 (% 3.2)	
Back pain	2 (% 5.1)	0	2 (% 6.4)	
No active complaints	9 (% 23.1)	2 (% 25)	7 (% 22.6)	
Those with a family history	1 (% 2.6)	0	1 (% 3.2)	0.61
Previously PAIR or surgical treated patients	5 (% 12.8)	1 (% 12.5)	4 (% 12.9)	0.97
Length of stay (day)	10.1 ± 6.8	6.4 ± 1.4	11.1 ± 7.3	0.08
Recurrence	5 (% 12.8)	1 (% 12.5)	4 (% 12.9)	0.97
Postoperative ERCP Requirement	8 (% 20.5)	0	8 (% 25.8)	0.11

Data are presented as mean±standard deviation, median (minimum-maximum), and frequency. PAIR: puncture, aspiration, injection, and re-aspiration; ERCP: Endoscopic Retrograde Cholangiopancreatography

whom were in the open surgery group (p=0.11) (Table 1).

Among the laboratory parameters evaluated in patients, indirect hemagglutination was positive in 28 patients. Four of these were in the laparoscopic group and 24 were in the open surgery group (p=0.058). The immunoglobulin G value was 20.5 (± 9.8) µl on average in all patients. When this value was examined in terms of subgroups, it was 14.5 (± 10.1) µl in the laparoscopic group and 22.1 (± 9.3) µl in the open group (p=0.048) (Table 2). Ultrasonography was used in 56.4% of patients, CT in 66.7%, and MRI in 46.2% during the diagnostic phase. A single cyst was most commonly detected in patients in all groups; all patients with multiple cysts were in the open group (p=0.23). The average size of the largest cyst was 8.2 cm in the laparoscopy group and 9.1 cm in the open group. (p=0.58) Eleven cysts were bile duct-related. Although bile duct-related cysts were more numerous in the open group, no statistically significant difference was found. (p=0.82) According to the Gharbi classification, type 1 and 2 cysts were significantly more common in the laparoscopy group, while type 3, 4, and 5 cysts were significantly more common in the open surgery group (p<0.001) (Table 2).

When the surgical procedures performed were evaluated, it was determined that the most frequently performed procedure in all

Table 2. Comparison of biochemical and radiological characteristics of patients

	Total (n=39)	Laparoscopic (n=8)	Open (n=31)	P
Indirect Hemagglutination Test				
Positive	28 (% 71.8)	4 (% 50)	24 (% 77.4)	
Negative	8 (% 20.5)	4 (% 50)	4 (% 12.9)	0.058
Not done	3 (% 7.7)	0	3 (% 9.7)	
Immunoglobulin G Level (µl)	20.5 ± 9.8	14.5 ± 10.1	22.1 ± 9.3	0.048
Diagnostic Methods				
Ultrasonography	22 (% 56.4)	4 (% 50)	18 (% 58.1)	0.68
Computed Tomography	26 (% 66.7)	6 (% 75)	20 (% 64.5)	0.57
Magnetic Resonance	18 (% 46.2)	2 (% 25)	16 (% 51.6)	0.18
Number of Cysts				
1	25 (% 64.1)	8 (% 100)	17 (% 54.8)	
2	8 (% 20.5)	0	8 (% 25.8)	
3	2 (% 5.1)	0	2 (% 6.5)	
4	0	0	0	0.23
5	3 (% 7.7)	0	3 (% 9.7)	
6	0	0	0	
7	1 (% 2.6)	0	1 (% 3.2)	
Largest cyst size (cm)	9 ± 4	8.2 ± 2.2	9.1 ± 4.4	0.58
Those Related to the Bile Duct	11 (% 28.2)	2 (% 25)	9 (% 29)	0.82
Gharbi classification				
Type 1	1 (% 2.6)	1 (% 12.5)	0	
Type 2	5 (% 12.8)	5 (% 62.5)	0	
Type 3	14 (% 35.9)	2 (% 25)	12 (% 38.7)	<0.001
Type 4	13 (% 33.3)	0	13 (% 41.9)	
Type 5	6 (% 15.4)	0	6 (% 19.3)	

Data are presented as mean±standard deviation, median (minimum-maximum), and frequency

Table 3. Surgical procedures performed

	Total (n=39)	Laparoscopic (n=8)	Open (n=31)	P
Surgical Procedure				
Abscess Drainage	1 (% 2.6)	0	1 (% 3.2)	
Segmentectomy	1 (% 2.6)	0	1 (% 3.2)	
Cystectomy and Drainage	4 (% 10.3)	0	4 (% 12.9)	0.55
Cystotomy and Drainage	30 (% 76.9)	8 (% 100)	22 (% 70.9)	
Partial Cystectomy and Drainage	3 (% 7.7)	0	3 (% 9.7)	

Data are presented as mean±standard deviation, median (minimum-maximum), and frequency

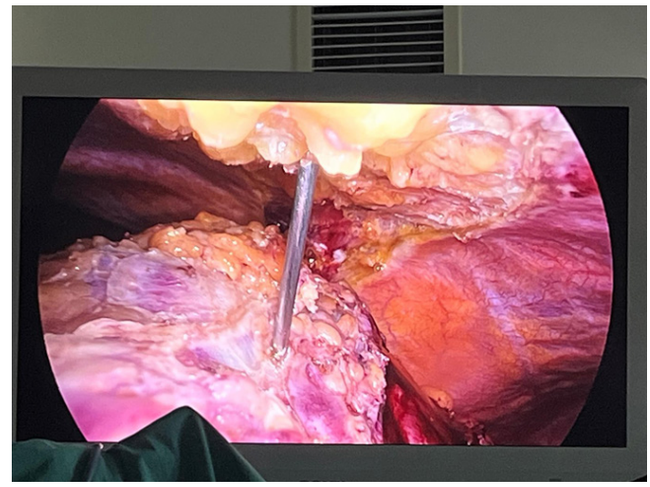

Figure 1. Images of a patient who underwent laparoscopic cystotomy and drainage

Figure 2. Images of a patient who underwent laparoscopic cystotomy and drainage

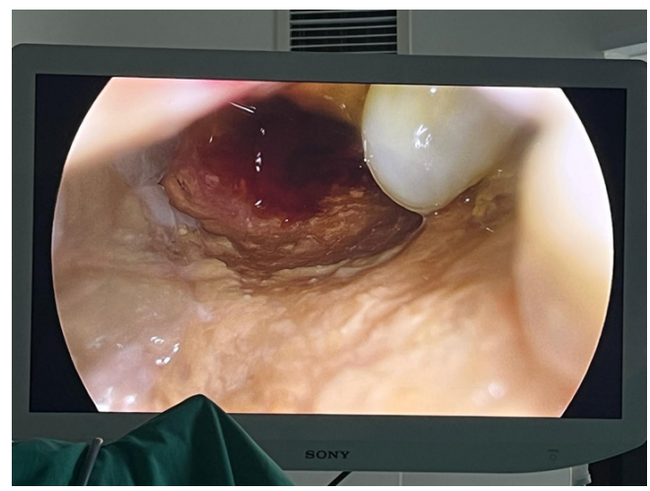

Figure 3. Images of a patient who underwent laparoscopic cystotomy and drainage

groups was cystotomy and drainage (p=0.55) (Table 3) (Figure 1-3).

Discussion

Liver hydatid cyst is one of the most common parasitic diseases. Although the use of the PAIR method in its treatment has become widespread, surgical treatment still retains its primary role. In particular, the use of minimally invasive methods such as laparoscopic and robotic surgery, which have become widely used in recent years, is increasing. In this study, laparoscopic and open techniques were compared.

In our study, the mean age of patients was 43.3, which is consistent with the literature [5,6]. Nearly half of the patients who underwent surgery were male, and the other half were female. A similar distribution was observed in many studies [7,8]. The most common reason for referral was abdominal pain. Similar studies in the literature have shown that patients most commonly present with complaints of abdominal pain [9,10]. Family history is detected at a low rate in studies [11] (5.6%). Similarly, in our study, there was one patient (2.6%) with a family history.

A hydatid cyst is a disease that can often recur. For this reason, in some patients who have previously undergone surgery, the disease may recur due to certain reasons related to the patient and the surgical procedure. In studies, the rate of patients who have previously undergone interventional procedures due to hydatid cyst among patients who have undergone surgery has been reported as 11.2% [11]. In our study, the percentage of patients who had previously undergone interventional treatment methods was found to be 12.8%. Open surgery was preferred in the majority of these patients (80%). It is likely that these recurrence cases were considered more complex and, due to previous surgical and interventional procedures, laparoscopic methods were less preferred in these patients.

The average length of stay in hospital was found to be 10.1 days, which was longer than in the laparoscopic group (11.1 days), although this difference was not statistically significant. This supports the finding reported in many previous studies that laparoscopic surgery results in shorter hospital stays [5,12].

When patients were evaluated in terms of recurrence, it was found that 4 of the 5 patients (12.8%) with recurrence were in the open group, and 1 patient was in the laparoscopic group. Shabani also reported that recurrence developed in 3 patients in the open group and 1 patient in the laparoscopic group [12]. In another study, the recurrence rate was reported to be 2.83% in laparoscopic surgery and 4.7% in open surgery [13]. Based on the information in the literature and the results of our study, it can be said that recurrence is more common in open surgery.

In our study, a total of 8 patients required ERCP in the postoperative period, and all of these patients were in the open surgery group. In addition, the number of bile-related cysts was numerically higher in the open surgery group. Previous studies have reported that the number of postoperative bile fistulas and the need for ERCP are higher in patients undergoing open surgery [14-17].

Most of the patients included in the study had a single cyst. However, although open surgery was more frequently preferred in patients with multiple cysts, no statistically significant difference was found. In studies similar to ours, the proportion of patients with a single cyst was generally found to be higher [9,12]. When the largest cyst diameters were examined, this value was found to be 9.1 cm in the open group and 8.2 cm in the laparoscopic group, and no significant difference was detected between the two groups. Similar studies in the literature have indicated that there is no significant relationship between the treatment method and cyst diameter [14,18].

When cysts were classified according to the Gharby classification, it was found that type 1 and 2 cysts were more common in the laparoscopy group, while type 3, 4, and 5 cysts were more common in the open surgery group. Kaya and colleagues also reported in their study that laparoscopy is more advantageous in type 1-3 cysts [19]. In our study, surgeons may have preferred laparoscopy more often in patients with these cysts.

Surgical treatment for hydatid cysts is divided into two categories: radical and conservative treatment. Radical surgery involves procedures such as pericystectomy and liver resection, while conservative surgery involves opening the cyst, removing its contents, and partially resecting the cyst. The most commonly used surgical procedure, whether laparoscopic or open, is cystotomy, which is a conservative treatment method involving the controlled opening of the cyst and the removal of its contents with the aid of scolosidal agents, followed by external drainage [7,9]. In our study, this method was the most frequently preferred in both the open and laparoscopic groups.

Limitation

The major limitation of this study is its retrospective design and small case series, which may be attributed to the rarity of intussusception in adults.

Conclusion

In conclusion, our study suggests that laparoscopic surgery is comparable to open surgery in terms of treatment efficacy. We believe that laparoscopy may also offer advantages in terms of hospital stay and recurrence rate. Further prospective studies with larger sample sizes are needed to clarify this issue.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and Human Rights Statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

Funding: *None*

Conflict of Interest

The authors declare that there is no conflict of interest.

References

1. Wen H, Vuitton L, Tuxun T, et al. Echinococcosis: Advances in the 21st Century. Clin Microbiol Rev. 2019;32(2):e00075-18.

2. Brunetti E, Kern P, Vuitton DA, Writing Panel for the WHO-IWGE. Expert consensus for the diagnosis and treatment of cystic and alveolar echinococcosis in humans. Acta Trop. 2010;114(1):1-16.

3. Brunetti E, White AC Jr. Cestode infestations: hydatid disease and cysticercosis. Infect Dis Clin North Am. 2012;26(2):421-35.

4. Chopra N, Gupta V, Rahul, et al. Liver hydatid cyst with cystobiliary communication: laparoscopic surgery remains an effective option. J Minim Access Surg. 2018;14(3):230-5.

5. Zaharie F, Bartos D, Mocan L, Zaharie R, Iancu C, Tomus C. Open or laparoscopic treatment for hydatid disease of the liver? A 10-year single-institution experience. Surg Endosc. 2013;27(6):2110-6.

6. Jabbari Nooghabi A, Mehrabi Bahar M, Asadi M, Jabbari Nooghabi M,

Jangjoo A. Evaluation and comparison of the early outcomes of open and laparoscopic surgery of liver hydatid cyst. Surg Laparosc Endosc Percutan Tech. 2015;25(5):403-7.
7. Bostanci O, Kartal K, Yazici P, Karabay O, Battal M, Mihmanli M. Laparoscopic versus open surgery for hydatid disease of the liver. A single center experience. Ann Ital Chir. 2016;87(1):237-41.
8. Polat FR. Hydatid cyst: open or laparoscopic approach? A retrospective analysis. Surg Laparosc Endosc Percutan Tech. 2012;22(3):264-6.
9. Elmoghazy W, Alqahtani J, Kim SW, Sulieman I, Elaffandi A, Khalaf H. Comparative analysis of surgical management approaches for hydatid liver cysts: conventional vs. minimally invasive techniques. Langenbecks Arch Surg. 2023;408(1):320.
10. Duta C, Pantea S, Lazar C, Salim A, Barjica D. Minimally invasive treatment of liver hydatidosis. JSLS. 2016;20(1):e2016.00002.
11. Cantay H, Anuk T. Factors affecting the choice of treatment in hepatic hydatid cyst surgery. J Invest Surg. 2022;35(4):731-6.
12. Shabani M, Behnam F, Akbari H, Eidy M. Comparison of the frequency of complications resulting from open and laparoscopic surgery for hydatid cyst. Asian J Endosc Surg. 2025;18(1):e13391.
13. Daradkeh S, El-Muhtaseb H, Farah G, Sroujieh AS, Abu-Khalaf M. Predictors of morbidity and mortality in the surgical management of hydatid cyst of the liver. Langenbecks Arch Surg. 2007;392(1):35-9.
14. Kunal BD, Rahul K, Govinda T, Hemanth K, Ganga RV, Harjeet S. Surgical management of hepatic hydatid cysts–conservative versus radical surgery. HPB.2020;22(10):1457–62.
15. Chen X, Chen X, Shao Y, Zhao J, Li H, Wen H. Clinical outcome and immune follow-up of different surgical approaches for human cyst hydatid disease in liver. Am J Trop Med Hyg. 2014;91(4):801–5.
16. Chen KF, Tang YY, Wang R, et al. The choose of different surgical therapies of hepatic alveolar echinococcosis: A single-center retrospective case-control study. Medicine (Baltimore). 2018;97(8):e0033.
17. Gupta N, Javed A, Puri S, Jain S, Singh S, Agarwal AK. Hepatic hydatid: PAIR, drain or resect? J Gastrointest Surg. 2011;15(10):1829–36.
18. Muhammedoğlu B, Pircanoğlu EM, Pişkin E, et al. Treatment of hepatic hydatid disease: role of surgery, ERCP, and percutaneous drainage: a retrospective study. Surg Laparosc Endosc Percutan Tech. 2020;31(3):313-20.
19. Kaya S, Altuntas YE, Kaptanoglu L, et al. Laparoscopic treatment of hepatic hydatid cysts. Our approach. Ann Ital Chir. 2019;90(1):560-4.

How to cite this article:
***Enes Şahin, Mehmet Eşref Ulutaş**. The effects of minimally invasive surgery in liver hydatid cysts. Ann Clin Anal Med 2025;16(8):603-607*

This study was approved by the Ethics Committee of Kocaeli University, Faculty of Medicine (Date: 2025-04-24, No: KÜ GOKAEK-2025/09/12)